# MIFARE® EXAMPLES

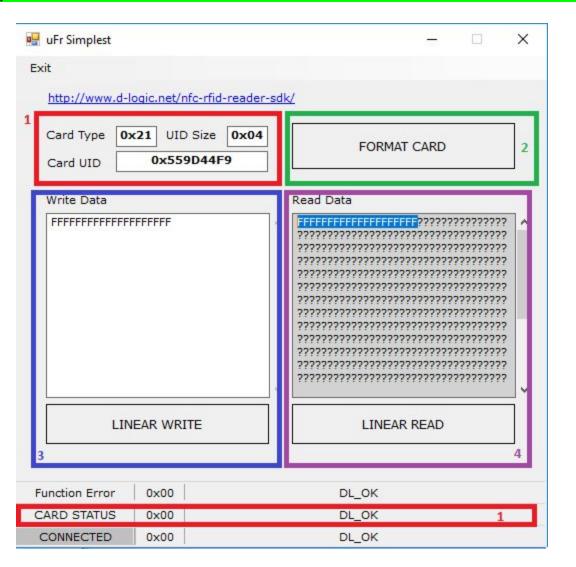
Download link: https://www.d-logic.net/code/nfc-rfid-reader-sdk/ufr-mf-examples-c sharp.git

You will see 3 different applications:

- Simplest It reads card UID, card type, reads/writes linear data on card. It can also format card with transport keys (FF FF FF FF FF).
- Simple same as simplest with added option of reader UI signals, reader type and serial number and card authentication option.
- Advance same as simple with more authentication option, which will be explained further in the manual.

for work with MIFARE® cards.

# **Simplest**



# 1. Card type and UID

After putting a card on the reader you will be able to see card type, uid, and uid length in bytes, also **CARD\_STATUS** will be changed from **NO\_CARD** to **DL\_OK**.

## 2. Format card

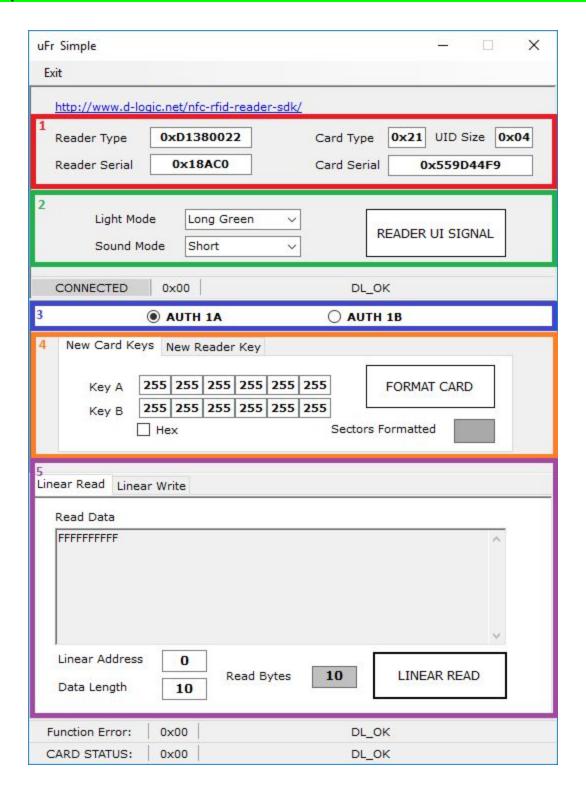
If you click button 'FORMAT CARD', all data on the card will be erased and all sector keys will be set to **0xFFFFFFFFFF** - 6 bytes.

# 3. Linear write

# 4. Linear read

If you click button 'LINEAR READ' you will be able to see all data on the card as shown on the picture. After clicking 'FORMAT CARD' and erasing all data from card we are now able to see only 10 bytes that we have wrote in the LINEAR READ text box.

# Simple



# 1. Reader type, reader serial, card type and UID

After opening application and putting card on the reader you will see reader type and serial number, card type, card uid and card uid size represented as hexadecimal numbers as shown on the picture.

# 2. Reader signalization

You can choose reader light and sound mode from combo boxes and after clicking 'READER UI SIGNAL' signalization will be visible and you can hear sound from speaker.

## 3. Authentication mode

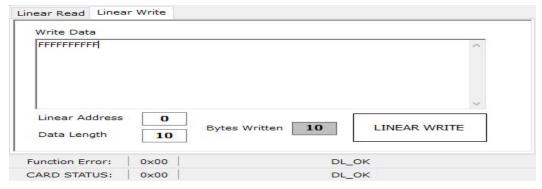
You can choose between authentication with key A or authentication with key B by clicking on radio boxes in section number '3'.

### 4. Format

- By clicking 'FORMAT CARD' which is on 'New Card Keys' tab, all data on the card will be erased and all sector keys will be set to 0xFFFFFFFFFF - 6 bytes.
- If you click on tab 'New Reader Key' you will be able to see button 'FORMAT READER KEYS' which will, after clicking, set all reader keys to **0xFFFFFFFFFF** 6 bytes.

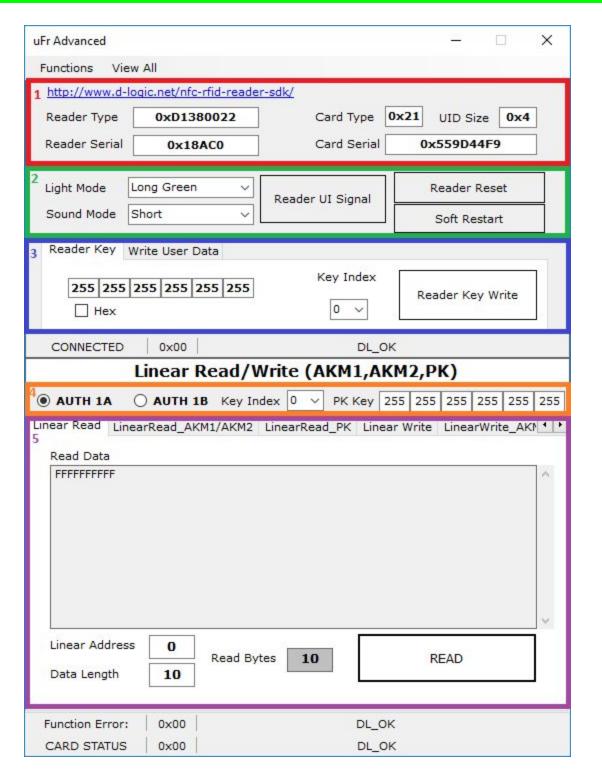
### 5. Linear read and Write

- On 'Linear Read' tab you have to choose linear address (where to start reading) and data length (how many bytes to read) and click 'LINEAR READ' button. After clicking you will be able to see card data in text box.
- On 'Linear Write' tab, you have to choose linear address (where to start writing) and input data into text box as shown in the picture below:



Data length will be automatically calculated. Bytes written shows a number of bytes that are written into card after clicking 'LINEAR WRITE' button.

## Advanced



# 1. Reader type, reader serial, card type and UID

After opening application and putting card on the reader you will see reader type and serial number, card type, card uid and card uid size represented as hexadecimal numbers as shown on the picture above.

# 2. Reader signalization and restart

You can choose reader light and sound mode from combo boxes and after clicking 'READER UI SIGNAL' signalization will be visible and you can hear sound from speaker.

Clicking 'Reader Reset' will cause physical reset of reader communication port.

If you click on button 'Soft Restart' it will restart the reader by software. It sets all readers parameters to default values and close RF field which resets all the cards in the field.

# 3. Reader keys and data

- In the 'Reader Key' tab you can see button 'Key Index' combo box in which you can choose between 0 31 key number to write into reader by clicking 'Reader Key Write' button.
- In the 'Write User Data' tab you can see text box with caption 'New User Data' in which you can type new user data and write it into reader by clicking 'Write User Data' button.

# 4. Authentication mode

You can choose between authentication with key A or authentication with key B by clicking on radio boxes in section number '4'.

Also, you can choose key index from combobox or enter Provided key (PK) - 6 bytes. They will be used depending on which tab you click in section '5' for linear reading and writing cards data.

- Linear Read using Key Index
- LinearRead AKM1/AKM2 using auth mode (AUTH 1A or AUTH 1B)
- LinearRead\_PK using Provided key
- Linear Write using Key Index
- LinearWrite AKM1/AKM2 using auth mode (AUTH1A or AUTH1B)
- LinearWrite\_PK using Provided key

### 5. Functions:

If you click on "Functions" at the top of the application, you will see dropdown list with more options for work.



- 5.1 Linear read / Linear write
- 5.2 Block read / Block write
- 5.3 Block in sector read / Block in sector write
- 5.4 Value block read / Value block write
- 5.5 Value block increment / Value block decrement
- 5.6 Value block in sector read / Value block in sector write
- 5.7 Value block in sector increment / Value block in sector decrement
- 5.8 Sector trailer write
- 5.9 Linear format card

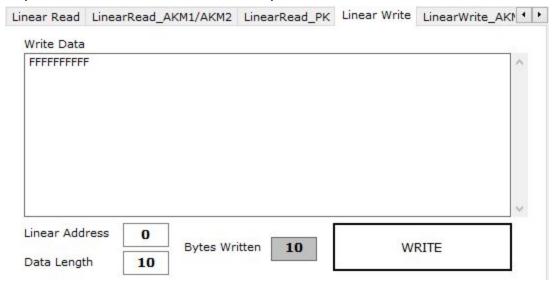
### 5.1 Linear read / Linear write

# Reading:

- On 'Linear Read' tab you have to choose key index and authentication mode (AUTH 1A or AUTH 1B) for reading which is in section '4', linear address (where to start reading) and data length (how many bytes to read) and click 'READ' button. After clicking you will be able to see card data in text box.
- On 'LinearRead\_AKM1/AKM2' tab you have to choose authentication mode (AUTH 1A or AUTH 1B) for reading which is in section '4', linear address (where to start reading) and data length (how many bytes to read) and click 'READ' button. After clicking you will be able to see card data in text box.

# Writing:

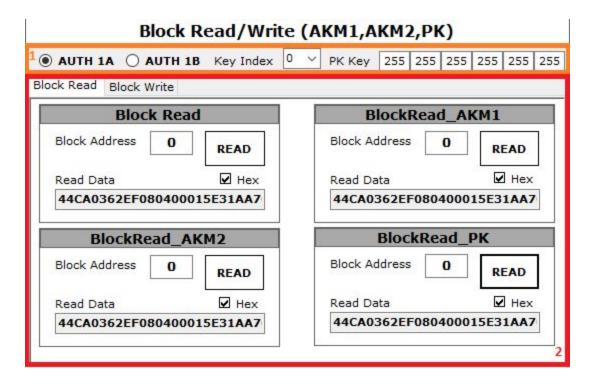
On 'Linear Write' tab, you have to choose key index and authentication mode (AUTH 1A or AUTH 1B) for writing which is in section '4', linear address (where to start writing) and input data into text box as shown in the picture below:



Data length will be automatically calculated. Bytes written shows a number of bytes that are written into card after clicking 'WRITE' button.

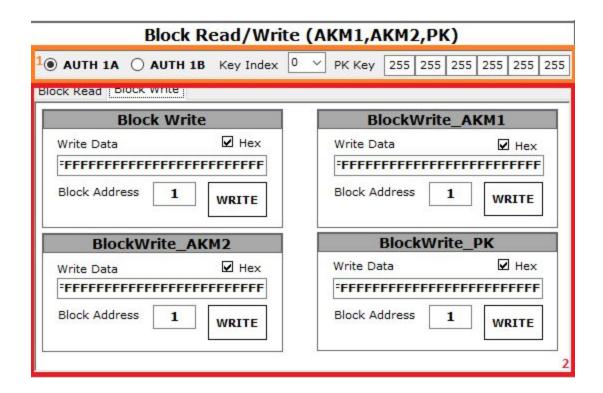
- On 'LinearWrite\_AKM1/AKM2' tab, you have to choose authentication mode (AUTH 1A or AUTH 1B) for writing which is in section '4', linear address (where to start writing) and input data into text box. Data length will be automatically calculated. Bytes written shows a number of bytes that are written into card after clicking 'WRITE' button.
- On 'LinearWrite\_PK' tab, you have to enter Provided key (6 bytes 0xFFFFFFFFFFF is default hex or 255 255 255 255 255 255 decimal) for writing which is in section '4', linear address (where to start writing) and input data into text box. Data length will be automatically calculated. Bytes written shows a number of bytes that are written into card after clicking 'WRITE' button.

Now, we will explain Block Read/Write option.



### Block read:

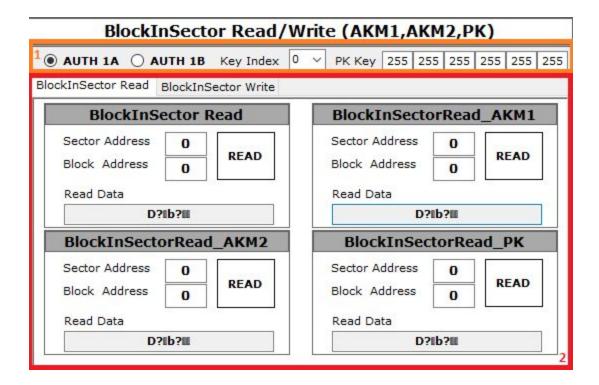
- In "Block Read" window you can choose block address and ASCII or hex data representation by checking 'Hex' checkbox. For successful reading, you have to choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) from section '1'. Block 0 data is shown at the picture above.
- In "BlockRead\_AKM1" 'window you can choose block address and ASCII or hex data representation by checking 'Hex' checkbox. For successful reading, you have to choose authentication mode (AUTH 1A or AUTH 1B) from section '1'. Block 0 data is shown at the picture above.
- In ''BlockRead\_AKM2" 'window you can choose block address and ASCII or hex data representation by checking 'Hex' checkbox. For successful reading, you have to choose authentication mode (AUTH 1A or AUTH 1B) from section '1'. Block 0 data is shown at the picture above.



## Block write:

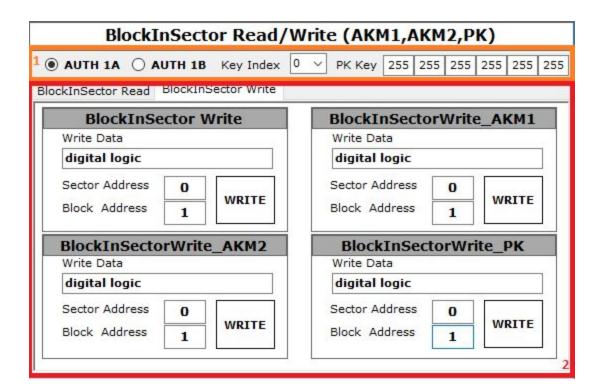
- In "Block Write" window you can choose block address and ASCII or hex data input by checking 'Hex' checkbox. For successful writing, you have to enter 16 bytes of data in textbox, choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) from section '1' and then click "WRITE" button. Block 1 data writing is shown at the picture above.
- In "BlockWrite\_AKM1" 'window you can choose block address and ASCII or hex data input by checking 'Hex' checkbox. For successful writing, you have to enter 16 bytes of data in textbox, choose authentication mode (AUTH 1A or AUTH 1B) from section '1' and then click "WRITE" button. Block 1 data writing is shown at the picture above.
- In "BlockWrite\_AKM2" 'window you can choose block address and ASCII or hex data input by checking 'Hex' checkbox. For successful writing, you have to enter 16 bytes of data in textbox, choose authentication mode (AUTH 1A or AUTH 1B) from section '1' and then click "WRITE" button. Block 1 data writing is shown at the picture above.
- In "BlockWrite\_PK" 'window you can choose block address and ASCII or hex data input by checking 'Hex' checkbox. For successful writing, you have to enter 16 bytes of data in textbox, Provided key (6 bytes - 0xFFFFFFFFFFFFFFF is default hex or 255 255 255 255 255 255 decimal) which is in section '1' and then click "WRITE" button. Block 1 data writing is shown at the picture above.

### 5.3 Block in sector read / Block in sector write



### Block in sector read:

- In "BlockInSector Read" window you can choose sector address and block address. For successful reading, you have to choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) from section '1'. Block 0 in sector 0 data is shown at the picture above.
- In "BlockInSectorRead\_AKM1" 'window you can choose sector address and block address. For successful reading, you have to choose authentication mode (AUTH 1A or AUTH 1B) from section '1'. Block 0 in sector 0 data is shown at the picture above.
- In "BlockInSectorRead\_AKM2" 'window you can choose sector address and block address. For successful reading, you have to choose authentication mode (AUTH 1A or AUTH 1B) from section '1'. Block 0 in sector 0 data is shown at the picture above.
- In 'BlockInSectorRead\_PK" 'window you can choose sector address and block address. For successful reading, you have to enter Provided key (6 bytes 0xFFFFFFFFFFFF is default hex or 255 255 255 255 255 decimal) which is in section '1'. Block 0 in sector 0 data is shown at the picture above.

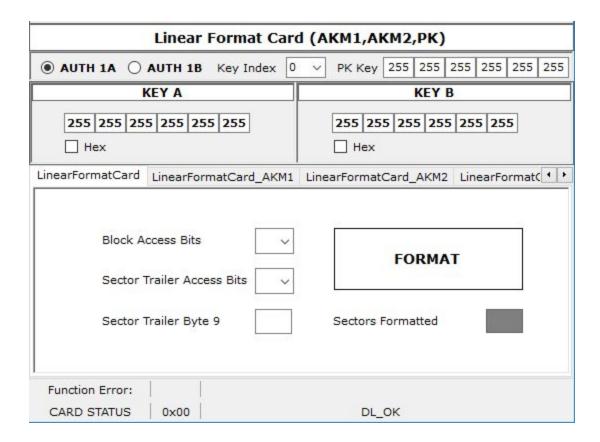


### Block in sector write:

- In 'BlockInSector Write' window you can choose sector address and block address and enter ASCII data For successful writing, you have to choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) from section '1'. Block 1 in sector 0 data writing is shown at the picture above.
- In "BlockInSectorWrite\_AKM1" window you can choose sector address and block address and enter ASCII data. For successful writing, you have to choose authentication mode (AUTH 1A or AUTH 1B) from section '1'. Block 1 in sector 0 data writing is shown at the picture above.
- In ''BlockInSectorWrite\_AKM2" window you can choose sector address and block address and enter ASCII data. For successful writing, you have to choose authentication mode (AUTH 1A or AUTH 1B) from section '1'. Block 1 in sector 0 data writing is shown at the picture above.
- In ''BlockInSectorWrite\_PK" 'window you can choose sector address and block address and enter ASCII data. For successful writing, you have to enter Provided key (6 bytes 0xFFFFFFFFFFF is default hex or 255 255 255 255 255 decimal) which is in section '1'. Block 1 in sector 0 data writing is shown at the picture above.

### **VALUE BLOCKS**

If you want to configure blocks for value, you have to change blocks access bits. Click on "Functions" dropdown list at the top of the application and then select "Linear Format Card" option.

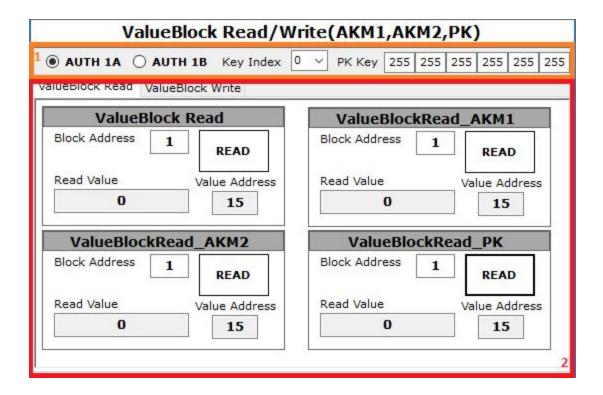


For configuring blocks as value blocks please refer to:

https://www.d-logic.net/code/nfc-rfid-reader-sdk/ufr-doc/blob/master/uFR%20Series%20NFC%2 Oreader%20API.pdf

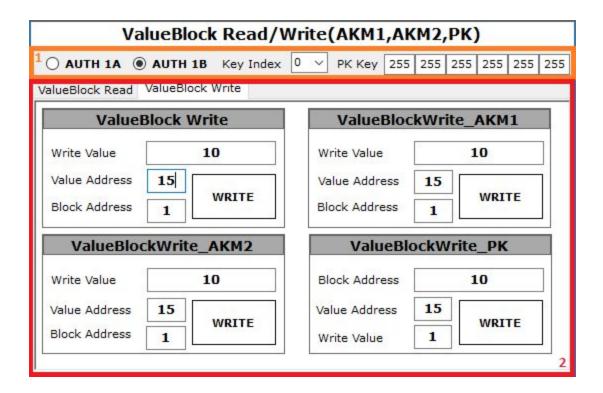
and look for "block access bits" and "sector trailer access bits".

### 5.4 Value block read / Value block write



# Value block read:

- In "ValueBlock Read" window you have to choose block address, appropriate key index and authentication mode (AUTH 1A or AUTH 1B) which are in section '1', then click "READ" button. Block 1 value reading is shown above
- In "ValueBlockRead\_AKM1" window you have to choose block address and authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "READ" button. Block 1 value reading is shown above
- In "ValueBlockRead\_AKM2" window you have to choose block address and authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click 'READ' button. Block 1 value reading is shown above.



### Value block write:

- In "ValueBlock Write" you have to enter value, value address, block address and choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) which are in section '1', then click "WRITE" button. Block 1 value writing is shown above.
- In "ValueBlockWrite\_AKM1" you have to enter value, value address, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "WRITE" button. Block 1 value writing is shown above.
- In "ValueBlockWrite\_AKM2" you have to enter value, value address, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "WRITE" button. Block 1 value writing is shown above.
- In "ValueBlockWrite\_PK" you have to enter value, value address, block address and you have to enter Provided key (6 bytes 0xFFFFFFFFFFFFFF is default hex or 255 255 255 255 255 255 255 decimal) which is in section '1', then click "WRITE" button. Block 1 value writing is shown above.

### 5.5 Value block increment / Value block decrement

### Value block increment:

ValueBlock Increment/Decrement (AKM1,AKM2,PK)								
O AUTH 1A O AUTH 1B Key Index	PK Key 255 255 255 255 255 255							
ValueBlock Increment ValueBlock Decremen	t							
ValueBlock Increment	ValueBlock Increment AKM1							
Increment Value 10 Block Address 1	Increment Value 10 Block Address 1							
INCREMENT	INCREMENT							
ValueBlock Increment AKM2	ValueBlock Increment PK							
Increment Value 10 Block Address 1	Increment Value 10 Block Address 1							
INCREMENT	INCREMENT							

- In "ValueBlock Increment" window you have to enter increment value, block address, and choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) which are in section '1', then click "INCREMENT" button. Block 1 value incrementing is shown above.
- In "ValueBlock Increment AKM1" window you have to enter increment value, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "INCREMENT" button. Block 1 value incrementing is shown above.
- In "ValueBlock Increment AKM2" window you have to enter increment value, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "INCREMENT" button. Block 1 value incrementing is shown above.
- In "ValueBlock Increment PK" window you have to enter increment value, block address and you have to enter Provided key (6 bytes 0xFFFFFFFFFFFFF is default hex or 255 255 255 255 255 255 decimal) which is in section '1', then click "INCREMENT" button. Block 1 value incrementing is shown above.

### Value block decrement:

ValueBlock Increment/D	ecrement (AKM1,AKM2,PK)		
O AUTH 1A   AUTH 1B Key Index	0 V PK Key 255 255 255 255 255 25		
/alueBlock Increment ValueBlock Decreme	ent		
ValueBlock Decrement	ValueBlockDecrement_AKM1		
Decrement Value 10  Block Address 1	Decrement Value 10  Block Address 1		
DECREMENT	DECREMENT		
ValueBlockDecrement_AKM2	ValueBlockDecrement_PK		
Decrement Value 10  Block Address 1	Decrement Value 10 Block Address 1		
DECREMENT	DECREMENT		

- In "ValueBlock Decrement" window you have to enter decrement value, block address, and choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) which are in section '1', then click 'DECREMENT' button. Block 1 value decrementing is shown above.
- In "ValueBlock Decrement AKM1" window you have to enter decrement value, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "DECREMENT" button. Block 1 value decrementing is shown above.
- In "ValueBlock Decrement AKM2" window you have to enter decrement value, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "DECREMENT" button. Block 1 value decrementing is shown above.

### 5.7 Value block in sector increment / Value block in sector decrement

### Value block in sector increment:

ValueBlockInSector Increment/Decrement(AKM1,AKM2,PK)									
• AUTH 1A O AUTH 1B Key Index	V PK Key 255 255 255 255 255 255								
ValueBlockInSector Increment ValueBlockInSector Decrement									
ValueBlockInSector Increment	ValueBlockInSectorIncrementAKM1								
Increment Value 10	Increment Value 10								
Sector Address 0 INCREMENT	Sector Address 0 INCREMENT 1								
ValueBlockInSectorIncrementAKM2 ValueBlockInSectorIncrementPK									
Increment Value 10	Increment Value 10								
Sector Address 0 INCREMENT	Sector Address  Block Address  1  INCREMENT  2								

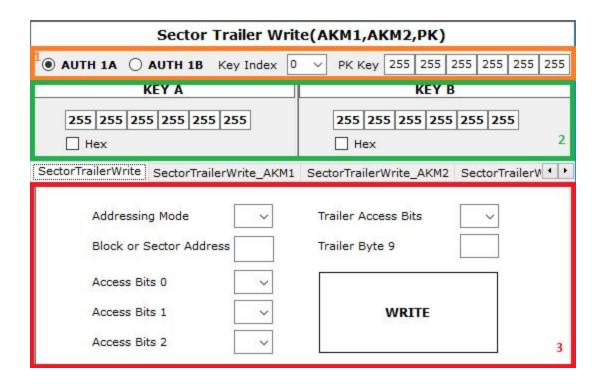
- In "ValueBlockInSector Increment" window you have to enter increment value, sector address, block address and choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) which are in section '1', then click "INCREMENT" button. Block 1 in sector 0 value incrementing is shown above.
- In "ValueBlockInSector Increment AKM1" window you have to enter increment value, sector address, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "INCREMENT" button. Block 1 in sector 0 value incrementing is shown above.
- In "ValueBlockInSector Increment AKM2" window you have to enter increment value, sector address, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "INCREMENT" button. Block 1 in sector 0 value incrementing is shown above.
- In "ValueBlockInSector Increment PK" window you have to enter increment value, sector address, block address you have to enter Provided key (6 bytes 0xFFFFFFFFFFF is default hex or 255 255 255 255 255 decimal) which is in section '1', then click "INCREMENT" button. Block 1 in sector 0 value incrementing is shown above.

## Value block in sector decrement:

ValueBlockInSector Increment/Decrement(AKM1,AKM2,PK)								
$^1$ $\odot$ AUTH 1A $\bigcirc$ AUTH 1B $$ Key Inde:	ex 0 V PK Key 255 255 255 255 255 255							
ValueBlockInSector Increment ValueBlockInSector Decrement								
ValueBlockInSector Decrement	ValueBlockInSectorDecrementAKM1							
Decrement Value 10	Decrement Value 10							
Sector Address  Block Address  1  DECREMENT	Sector Address 0 Block Address 1							
ValueBlockInSectorDecrementAKM2 ValueBlockInSectorDecrementPK								
Decrement Value 10	Decrement Value 10							
Sector Address  Block Address  1  DECREMENT	Sector Address 0 Block Address 1  DECREMENT 2							

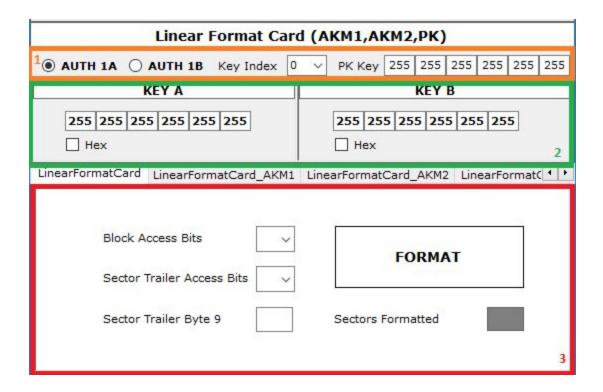
- In "ValueBlockInSector Decrement" window you have to enter decrement value, sector address, block address and choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) which are in section '1', then click "DECREMENT" button. Block 1 in sector 0 value decrementing is shown above.
- In "ValueBlockInSector Decrement AKM1" window you have to enter decrement value, sector address, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "DECREMENT" button. Block 1 in sector 0 value decrementing is shown above.
- In "ValueBlockInSector Decrement AKM2" window you have to enter decrement value, sector address, block address and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "DECREMENT" button. Block 1 in sector 0 value decrementing is shown above.

### 5.8 Sector trailer write



- In "SectorTrailerWrite" tab you have to enter new key A and new key B which are in section '2', choose addressing mode (0 absolute or 1 relative), sector address, block 0 access bits, block 1 access bits, block 2 access bits, sector trailer access bits, sector trailer byte 9 which are in section '3' and choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "WRITE" button.
- In "SectorTrailerWrite\_AKM1" tab you have to enter new key A and new key B which are
  in section '2', choose addressing mode (0 absolute or 1 relative), sector address, block
  0 access bits, block 1 access bits, block 2 access bits, sector trailer access bits, sector
  trailer byte 9 which are in section '3' and choose authentication mode (AUTH 1A or AUTH
  1B) which is in section '1', then click "WRITE" button.
- In "SectorTrailerWrite\_AKM2" tab you have to enter new key A and new key B which are in section '2', choose addressing mode (0 absolute or 1 relative), sector address, block 0 access bits, block 1 access bits, block 2 access bits, sector trailer access bits, sector trailer byte 9 which are in section '3' and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "WRITE" button.
- In "SectorTrailerWrite\_PK" tab you have to enter new key A and new key B which are in section '2', choose addressing mode (0 absolute or 1 relative), sector address, block 0 access bits, block 1 access bits, block 2 access bits, sector trailer access bits, sector trailer byte 9 which are in section '3' and you have to enter Provided key (6 bytes -

#### 5.9 Linear format card



- In "LinearFormatCard" tab you have to enter new key A and new key B which are in section '2', block access bits, sector trailer access bits and sector trailer byte 9 which are in section '3' and choose appropriate key index and authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "FORMAT" button.
- In "LinearFormatCard\_AKM1" tab you have to enter new key A and new key B which are in section '2', block access bits, sector trailer access bits and sector trailer byte 9 which are in section '3' and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "FORMAT" button.
- In "LinearFormatCard\_AKM2" tab you have to enter new key A and new key B which are in section '2', block access bits, sector trailer access bits and sector trailer byte 9 which are in section '3' and choose authentication mode (AUTH 1A or AUTH 1B) which is in section '1', then click "FORMAT" button.
- In "LinearFormatCard\_PK" tab you have to enter new key A and new key B which are in section '2', block access bits, sector trailer access bits and sector trailer byte 9 which are in section '3' and you have to enter Provided key (6 bytes 0xFFFFFFFFFFFFFF is default hex or 255 255 255 255 255 decimal) which is in section '1', then click "FORMAT" button.